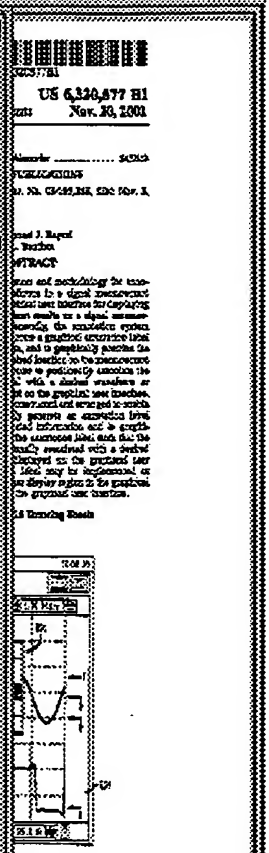
Detailed Description Text - DETX (2):

The present invention is a real-time annotation system and methodology for annotating measurement displays in a signal measurement system that includes a graphical user interface for displaying waveforms and measurement results on a signal measurement system display. In one aspect of the invention, the annotation system is configured to enable an operator to graphically generate an annotation label containing any desired information and to position the annotation label at any desired location on the display, including positionally associating the annotation label with desired waveform(s) or waveform feature(s) displayed on the signal measurement system graphical user interface. The information may be predefined or represent real-time observations, and may be of any form, including textual and symbolic information. Preferably, the operator can also control the appearance characteristics of the rendered annotation label. It is also preferable that additional icons be available for inclusion in the annotation label to facilitate visual association with a desired waveform or waveform feature.

Detailed Description Text - DETX (3):

FIG. 1 is a functional block diagram of an exemplary digital oscilloscope suitable for implementing the present invention. FIG. 1 is a functional block diagram of an exemplary computer-based system also suitable for implementing the present invention. Referring to FIG. 1, the digital oscilloscope 100 is a



Detailed Description Text - DETX (2):

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Detailed Description Text - DETX (3):

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Detailed Description Text - DETX (7):

The waveform analyzer 138 performs measurement processes for developing the waveform for display. The waveform analyzer 138 contains hardware and software components to perform well-known operations such as setting the analog-to-digital codes for the acquisition unit 132 and mapping the resulting digital information to the physical pixel locations which are ultimately presented on the display 112 under the control of the graphical user interface 116. The pointing device 110 and/or the keyboard 108 are used to move a cursor on the GUI-controlled display 112 to select display elements adjacent to or under the cursor. The pointing devices 110 may include any well-known pointing devices such as a mouse, track ball, joystick, touch screen, data glove, etc. The cursor may additionally be controlled with any one or more keyboards located externally or integrated into a front panel of the digital oscilloscope 100.

Detailed Description Text - DETX (10):

The video display control sub-system 126 includes a display controller 150 and a multiplexer 152. The controller 150 controls which of the two inputs to the multiplexer 152 are processed into display signals for transmission to the display 112 under the control of the graphical user interface 116. The display

Detailed Description Text - DETX (17):

FIG. 2 is a functional block diagram of one embodiment of annotation system 118 of the present invention. A high level description of the exemplary embodiment of annotation system 118 will now be provided in detail below with reference to the exemplary graphical user interface displays illustrated in FIGS. 5-9. FIG. 5 is an illustration of a graphical user interface showing an annotation label instruction dialog box displayed in accordance with one embodiment of the present invention. FIG. 6 is an illustration of a graphical user interface showing a general instruction menu list that includes a menu option associated with the present invention. FIG. 7 is an illustration of a graphical user interface showing one embodiment of a label content control dialog box. FIG. 8 is an illustration of a graphical user interface showing a multiple annotation labels along with a label modification menu list displayed in accordance with one embodiment of the present invention. FIG. 9 is an illustration of a graphical user interface showing an exemplary color options menu list.

Detailed Description Text - DETX (18):

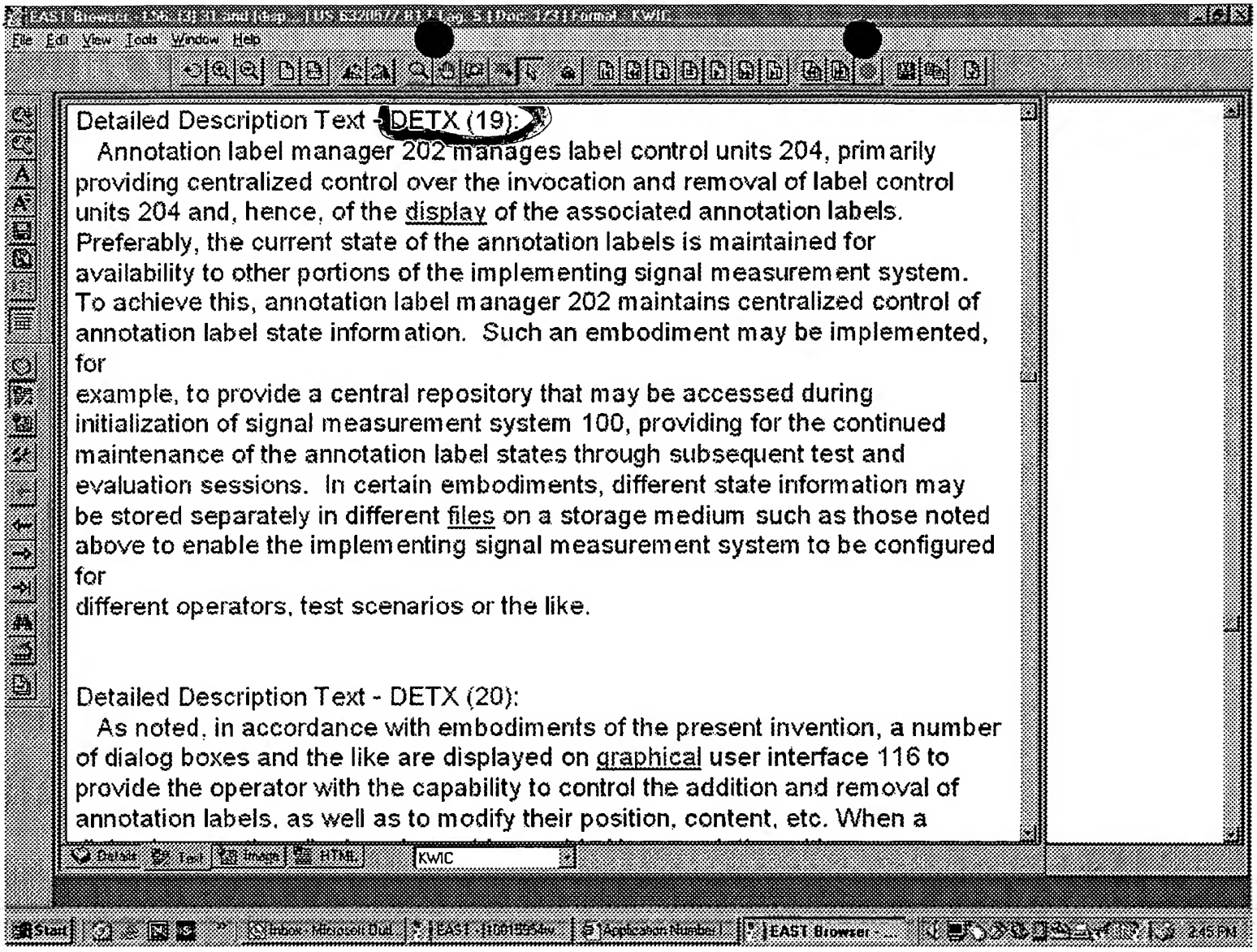
System 118 broadly includes annotation label manager 202 and a plurality of label control units 204. Each label control unit 204 is constructed and arranged to manage the display and graphical interactivity with, an associated annotation label rendered on graphical user interface 116. Each label control unit 204 provides the operator with the capability to determine the content of

Detailed Description Text - DETX (18):

System 118 broadly includes annotation label manager 202 and a plurality of label control units 204. Each label control unit 204 is constructed and arranged to manage the display and graphical interactivity with, an associated annotation label rendered on graphical user interface 116. Each label control unit 204 provides the operator with the capability to determine the content of the associated annotation label, the location of the annotation label on a waveform display and, preferably, the appearance, size and shape of the annotation label. Each label control unit 204 is preferably a logical association of software code such as one or more modules in a structured programming language such as the C programing language. In one preferred embodiment, label control units 204 include objects of one or more object classes in an in an object-oriented software language, such as the C++ programing language.

Detailed Description Text - DETX (19):

Annotation label manager 202 manages label control units 204, primarily providing centralized control over the invocation and removal of label control units 204 and, hence, of the display of the associated annotation labels. Preferably, the current state of the annotation labels is maintained for availability to other portions of the implementing signal measurement system. To achieve this, annotation label manager 202 maintains centralized control of annotation label state information. Such an embodiment may be implemented,



Detailed Description Text - DETX (19):

Annotation label manager 202 manages label control units 204, primarily providing centralized control over the invocation and removal of label control units 204 and, hence, of the display of the associated annotation labels. Preferably, the current state of the annotation labels is maintained for availability to other portions of the implementing signal measurement system. To achieve this, annotation label manager 202 maintains centralized control of annotation label state information. Such an embodiment may be implemented, for example, to provide a central repository that may be accessed during initialization of signal measurement system 100, providing for the continued maintenance of the annotation label states through subsequent test and evaluation sessions. In certain embodiments, different state information may be stored separately in different files on a storage medium such as those noted above to enable the implementing signal measurement system to be configured for different operators, test scenarios or the like.

Detailed Description Text - DETX (20):

As noted, in accordance with embodiments of the present invention, a number of dialog boxes and the like are displayed on graphical user interface 116 to provide the operator with the capability to control the addition and removal of annotation labels, as well as to modify their position, content, etc. When a

deletion of associated annotation labels are not processed by label control units 204 themselves. Instead, label control units 204 are constructed and arranged to forward such commands and function calls to annotation label manager 202 for processing. As will be explained in detail below, annotation label manager 202 generates system calls to operating system 114 to instantiate and destroy label control unit objects in accordance with the creation and deletion requests presented by graphical user interface 116.

Detailed Description Text - DETX (22):

In addition, in accordance with certain embodiments of the present invention, graphical user interface 116 generates dialog boxes, windows, menu lists, icons or the like which are associated with the present invention. Configuration of graphical user interface 116 and/or operating system 114 to generate such windows, dialog boxes and the like is considered to be well known in the art. The inclusion of menu items, button, icons or other display elements for invoking functions of annotation system 118 in such display windows, menu lists, dialog boxes, etc., is also considered to be within the purview of those of ordinary skill in the art and, therefore, has not been described in detail herein.

Detailed Description Text - DETX (23):

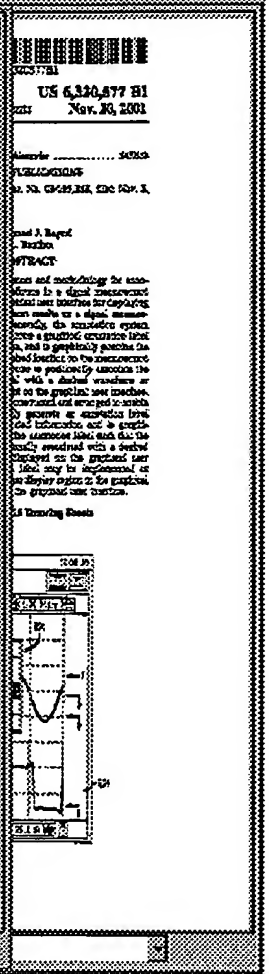
Furthermore, label control units 204 interoperate in a well known manner with graphical user interface 116 to render dialog boxes, annotation labels

Detailed Description Text - DETX (81):

Preferably the annotation label state information stored in data structure 320 is globally available. This information may then be recalled as part of the implementing system's set up procedure. This enables the setting established by an operator to be saved for subsequent uses of the implementing system. As one skilled in the art would find apparent, an operator can save system set up configurations. This causes the capture of designated states of the system. For signal measurement systems, for example, this includes all control settings, scale factors, active channels, and the like. In accordance with one embodiment of the present invention, the annotation labels are also stored and recalled as part of a previous set up for subsequent recall. This information may also be stored in individual files to implement different configurations for different circumstances, such as different test procedures, different operators, and the like.

Detailed Description Text - DETX (83):

Referring now to FIG. 13, a single waveform display 504 is defined by its boundaries on the display 112. The origin of waveform display 504 is the upper left corner, designated as (x.sub.ro,y.sub.ro), where "r" represents that this is a waveform display rectangle of pixels on which waveform display 504 is rendered as defined by graphical user interface 116. The "o" represents that this coordinate value is the origin of that rectangle.



Detailed Description Text - DETX (87):

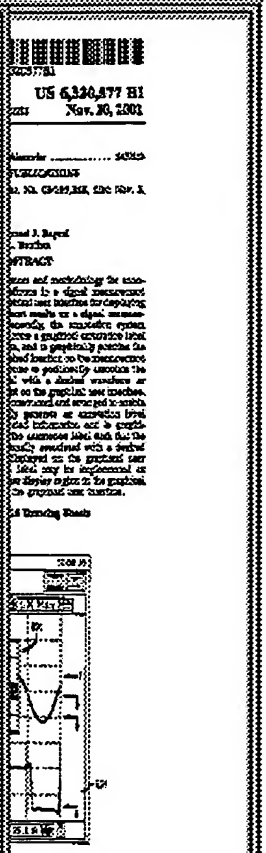
In the illustrative embodiment, an update label size process 1000 is performed in response to a command indicating that the font or text of a currently displayed annotation label has been changed by the operator. In addition, process 1000 is performed when an annotation label is first generated by a label control unit 204. For purposes of the present invention, such initial determination of the appearance and content of a new annotation label is modeled as a font and text change since these values are being processed for the first time when the annotation label is created.

Detailed Description Text - DETX (88):

At block 1004, a label control unit 204 receives a font. This occurs when label control unit 204 receives a rendering change command 272 from graphical user interface 116 that contains a font change. Label control unit 204 also retrieves the font stored locally when label control unit 204 receives a change in the content of the associated annotation label. In the illustrative embodiment, this content change occurs when label control unit 204 receives a new text data structure 268 from text entry dialog 278. If new font selection has been received, this information is stored locally for future calculations.

Detailed Description Text - DETX (89):

The width and the height of the received text is computed at block 1006.

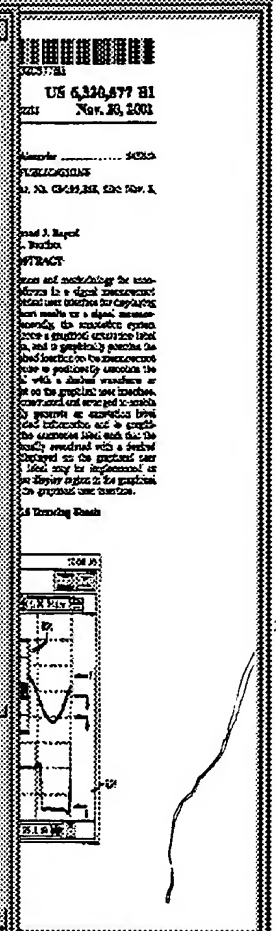


Detailed Description Text - DETX (91):

Once the height and width required to render the text in an annotation label, label control unit 204 determines the size and position of the resulting annotation label. First, at block 1012, label control unit 204 determines the waveform display rectangle limits which are applicable to the current location of the annotation label. If there are two waveform displays currently displayed, such as regular and magnified waveform display regions, then label control unit 204 must determine in which the associated annotation label will be rendered. This is described further below with reference to FIG. 11.

Detailed Description Text - DETX (94):

After the process is invoked at block 1102, label control unit 204 determines whether additional waveform displays are currently rendered on the graphical user interface. In the illustrative embodiment, there may be one additional waveform display for displaying a magnified view of selected waveforms displayed in the original waveform display. When such a feature is implemented in the signal measurement system, the waveform display is the to be
"split" between the two displays. As noted above, the graphical user interface 116 provides annotation label manager 202 with the rectangle limits of the waveform display via the rectangle limits command 226. Annotation label manager 202 forwards this information to the label control units 204 in the rectangle limits data structure 228. This information is stored locally and



Detailed Description Text - DETX (118):

While various embodiments of the present invention have been described above, it should be understood that they have been presented by way of example only, and not limitation. For example, the present invention is preferable implemented in the signal measurement system 100. However, as one skilled in the relevant art would find apparent, the teachings of the present invention may be implemented to enable a user to annotate any display element other than waveforms in systems other than a signal measurement system. It should also be noted that any techniques now or later developed may be used to implement the features of the present invention, such as local or distributed databases for storage of the data structures; the type and format of the data structures, such as linked lists, tables, etc., the manner in which the IDs, status fields, and measurement parameters are represented, the manner in which the present invention interfaces with the graphical user interface, the manner in which the information is displayed to the user, etc. Thus, the breadth and the scope of the present invention are not limited by any of the above exemplary embodiments, but are defined only in accordance with the following claims and their equivalents.

Claims Text - CLTX (1):

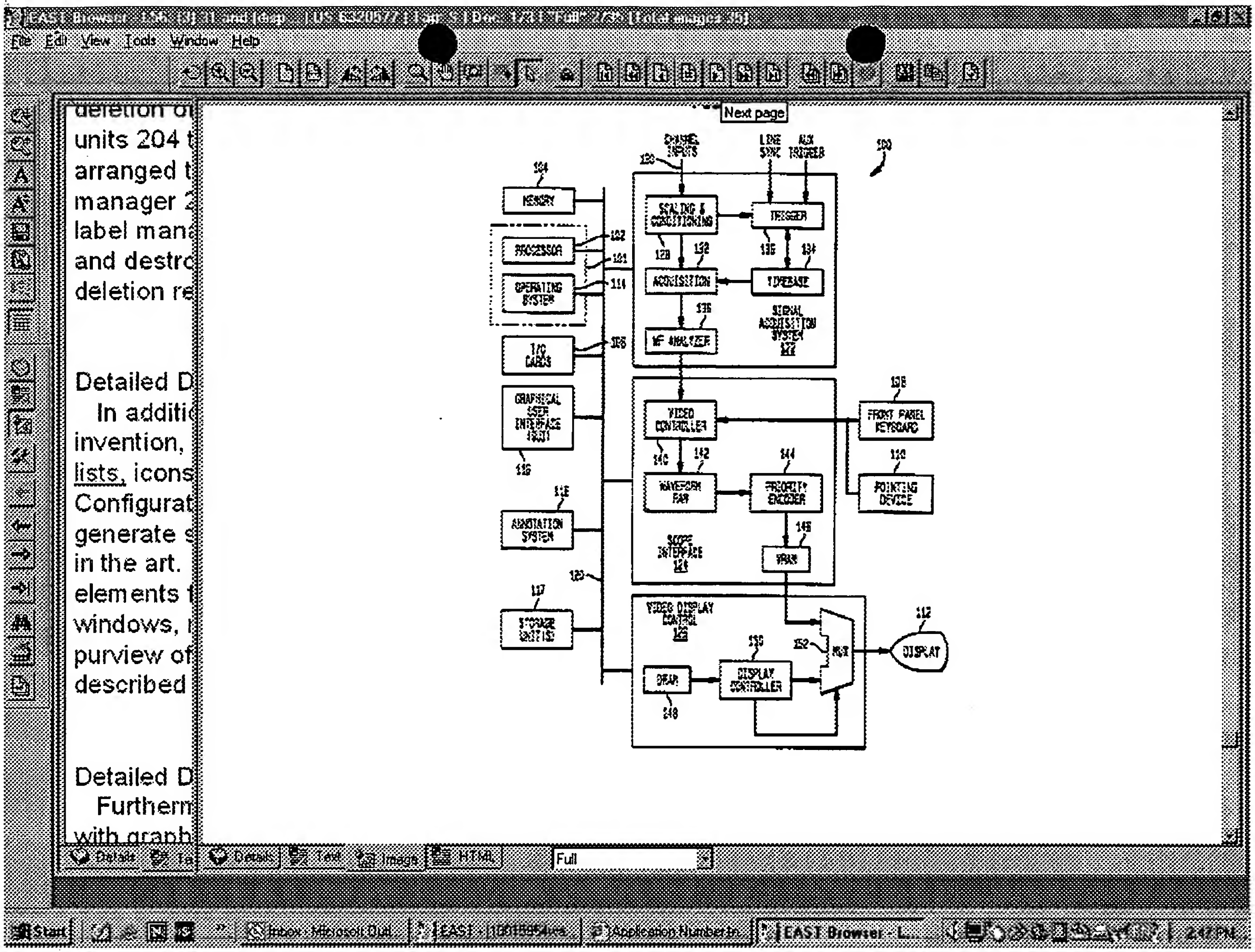

File Edit View Tools Window Help
Next page
units 204 t
arranged t
manager 2
label mana
and destro
deletion re
Detailed D
In additi
invention,
lists, icons
Configurat
generate s
in the art.
elements t
windows, r
purview of
described
Detailed D
Furtherm
CHANNEL INPUTS
LINE SYNC
AUX TRIGGER
100
MEMORY
PROCESSOR
OPERATING SYSTEM
I/O CARDS
GRAPHICAL USER INTERFACE (GUI)
ANNOTATION SYSTEM
STORAGE UNIT(S)
SCALING & CONDITIONING
TRIGGER
ACQUISITION
TIMEBASE
SIGNAL ACQUISITION SYSTEM
WF ANALYZER
VIDEO CONTROLLER
FRONT PANEL KEYBOARD
WAVEFORM RAM
PRIORITY ENCODER
POINTING DEVICE
SCOPE INTERFACE
VRAM
VIDEO DISPLAY CONTROL
DRAM
DISPLAY CONTROLLER
MUX
DISPLAY
Details
Text
Image
HTML
Full
Start

FIG. 5

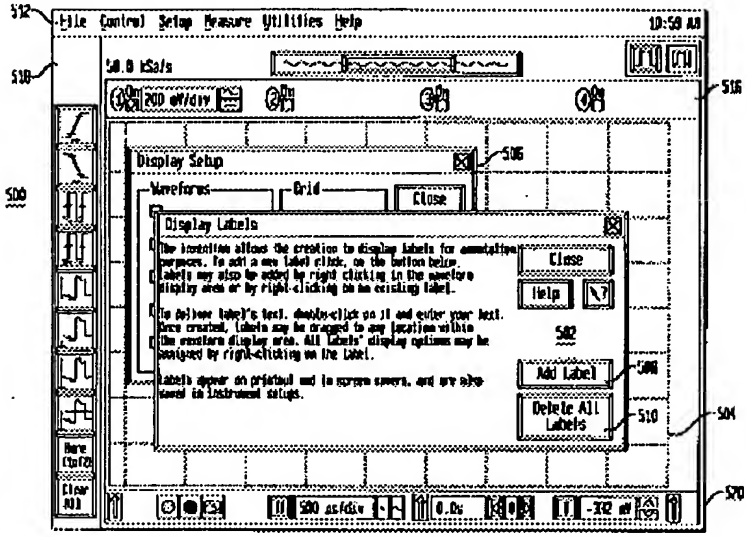

File Control Setup Measure Utilities Help
Display Setup
Waveforms
Grid
Close
Display Labels
Close
Help
Add Label
Delete All Labels
502
504
506
508
510
512
516
518
520

FIG. 6

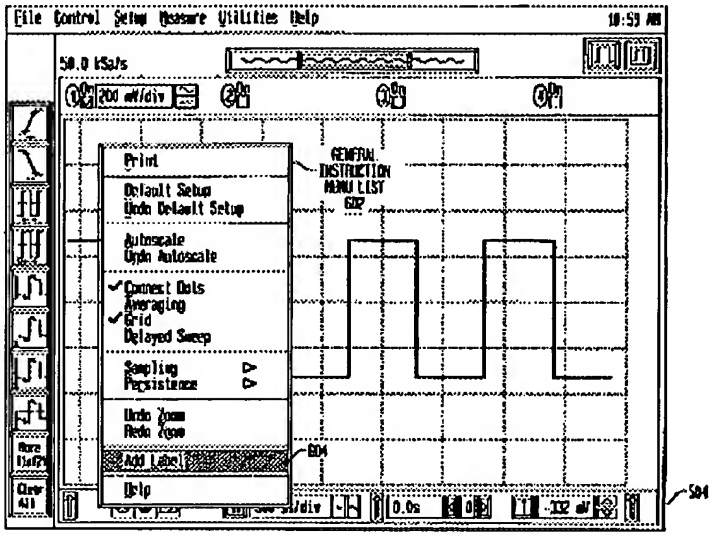

File Control Setup Measure Utilities Help
10:53 AM
50.0 kSa/s
200 mV/div
Print
Default Setup
Undo Default Setup
Autoscale
Undo Autoscale
Connect Dots
Averaging
Grid
Delayed Sweep
Sampling
Persistence
Undo Zoom
Redo Zoom
Add Label
Help
GENERAL INSTRUCTION MENU LIST
602
604
504
0.0s

FIG. 7

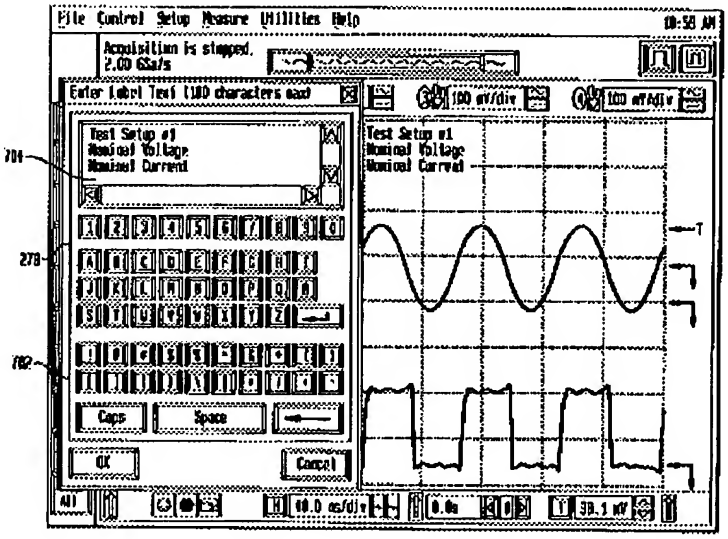

File Control Setup Measure Utilities Help
Acquisition is stopped.
2.00 GSa/s
Enter Label Text (100 characters max)
Test Setup #1
Nominal Voltage
Nominal Current
Caps
Space
OK
Cancel
704
278
702

FIG. 8

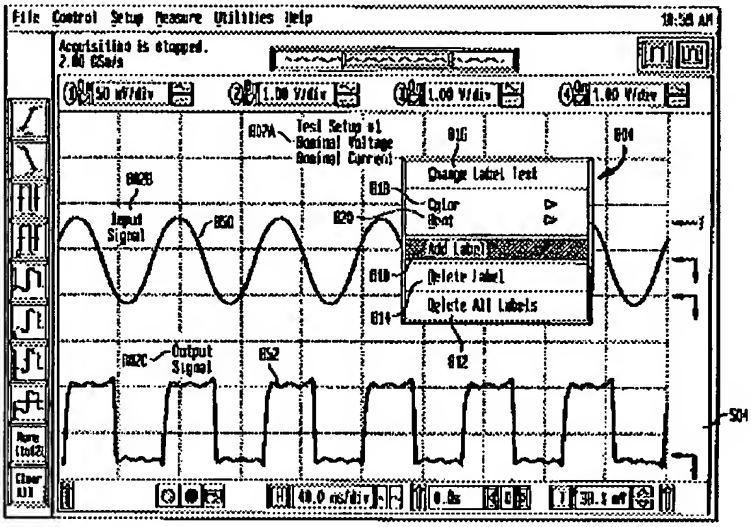
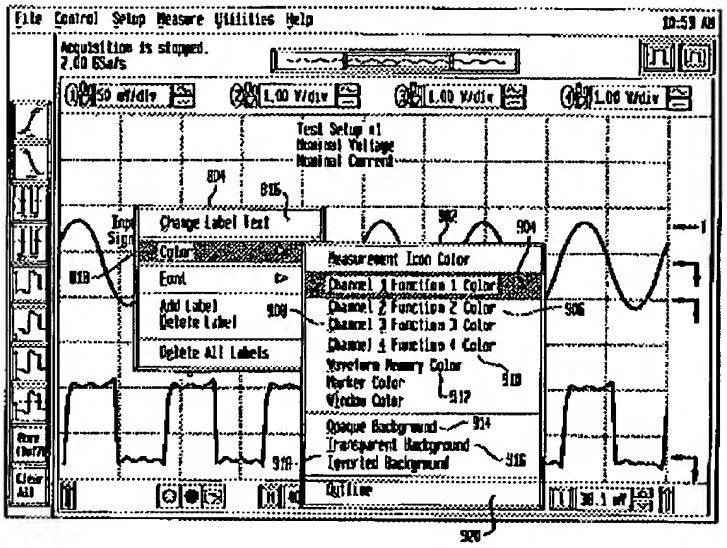

File Control Setup Measure Utilities Help
Acquisition is stopped.
Test Setup #1
Nominal Voltage
Nominal Current
Change Label Text
Color
Short
Add Label
Delete Label
Delete All Labels
Input Signal
Output Signal
850
852
802A
802B
802C
804
806
808
810
812
814
816
818
820
504

FIG. 9


File Control Setup Measure Utilities Help
10:59 AM
Acquisition is stopped.
2.00 GSa/s
Change Label Text
Color
Font
Add Label
Delete Label
Delete All Labels
Measurement Icon Color
Channel 1 Function 1 Color
Channel 2 Function 2 Color
Channel 3 Function 3 Color
Channel 4 Function 4 Color
Waveform Memory Color
Marker Color
Window Color
Opaque Background
Transparent Background
Inverted Background
Outline
804
815
902
904
906
908
910
912
914
916
918
920

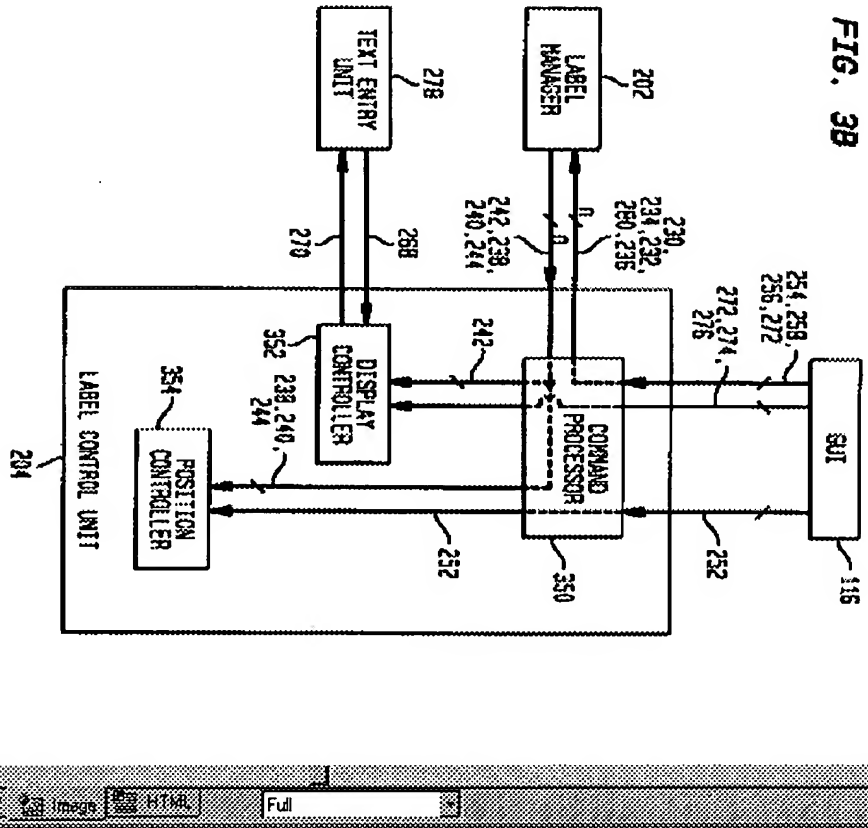

LABEL MANAGER
202
TEXT ENTRY UNIT
278
270
268
230, 231, 232, 280, 236
242, 238, 240, 244
254, 258, 256, 272
272, 274, 276
242
DISPLAY CONTROLLER
352
238, 240, 244
354
POSITION CONTROLLER
LABEL CONTROL UNIT
284
COMMAND PROCESSOR
350
252
252
GUI
116

FIG. 3B

FIG. 5

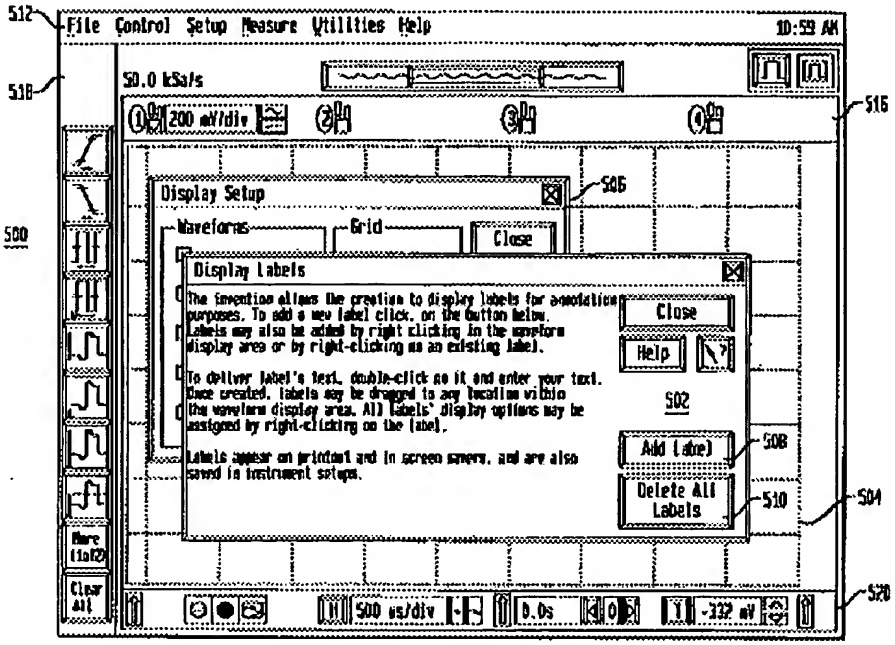

512
File Control Setup Measure Utilities Help
10:59 AM
50.0 kSa/s
510
200 mV/div
516
Display Setup
506
500
Waveforms
Grid
Close
Display Labels
The invention allows the creation to display labels for annotation purposes. To add a new label click, on the button below. Labels may also be added by right clicking in the waveform display area or by right-clicking on an existing label.
To deliver label's text, double-click on it and enter your text. Once created, labels may be dragged to any location within the waveform display area. All labels' display options may be assigned by right-clicking on the label.
Labels appear on printout and in screen savers, and are also saved in instrument setups.
Close
Help
502
Add Label
508
Delete All Labels
510
504
More (1of2)
Clear All
500 us/div
0.0s
-332 mV
520

FIG. 6

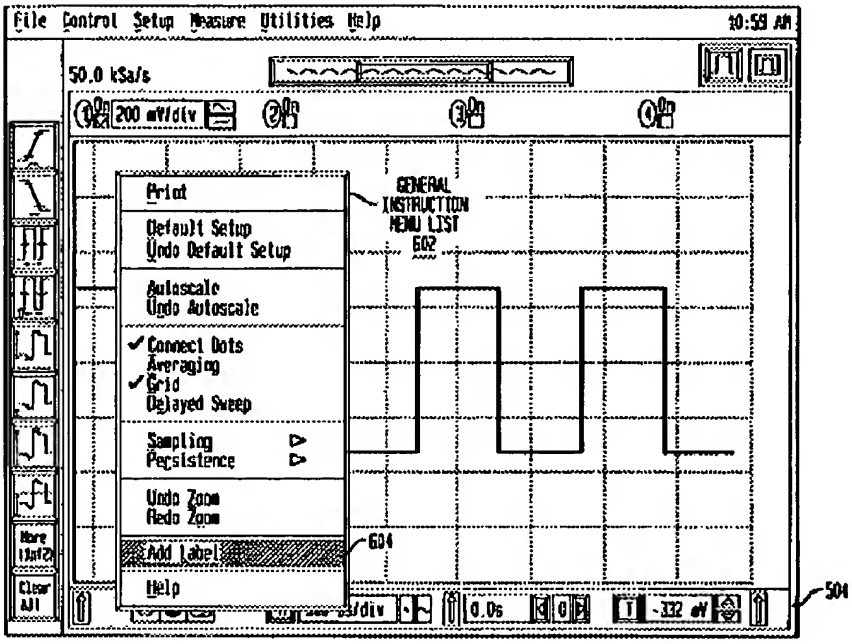
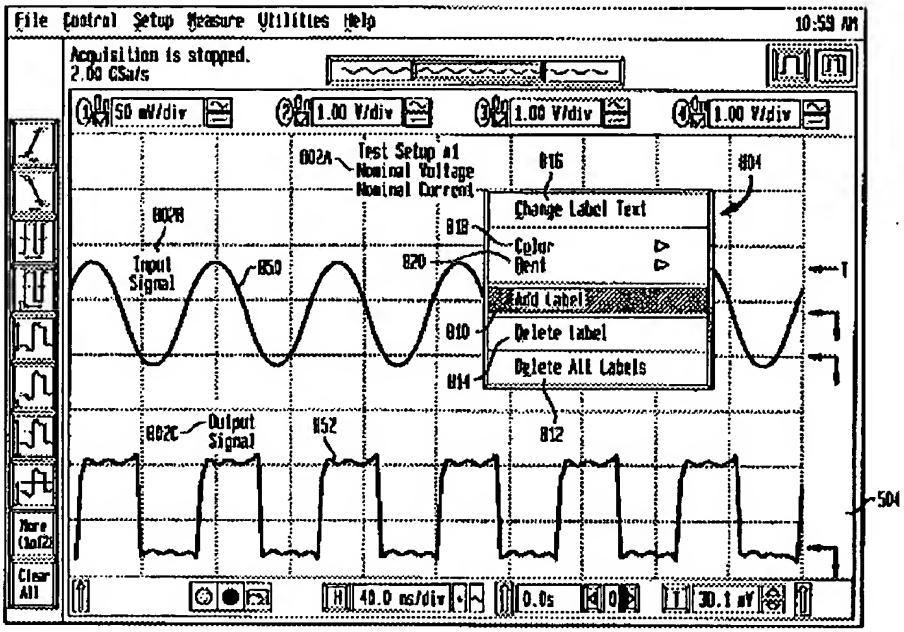
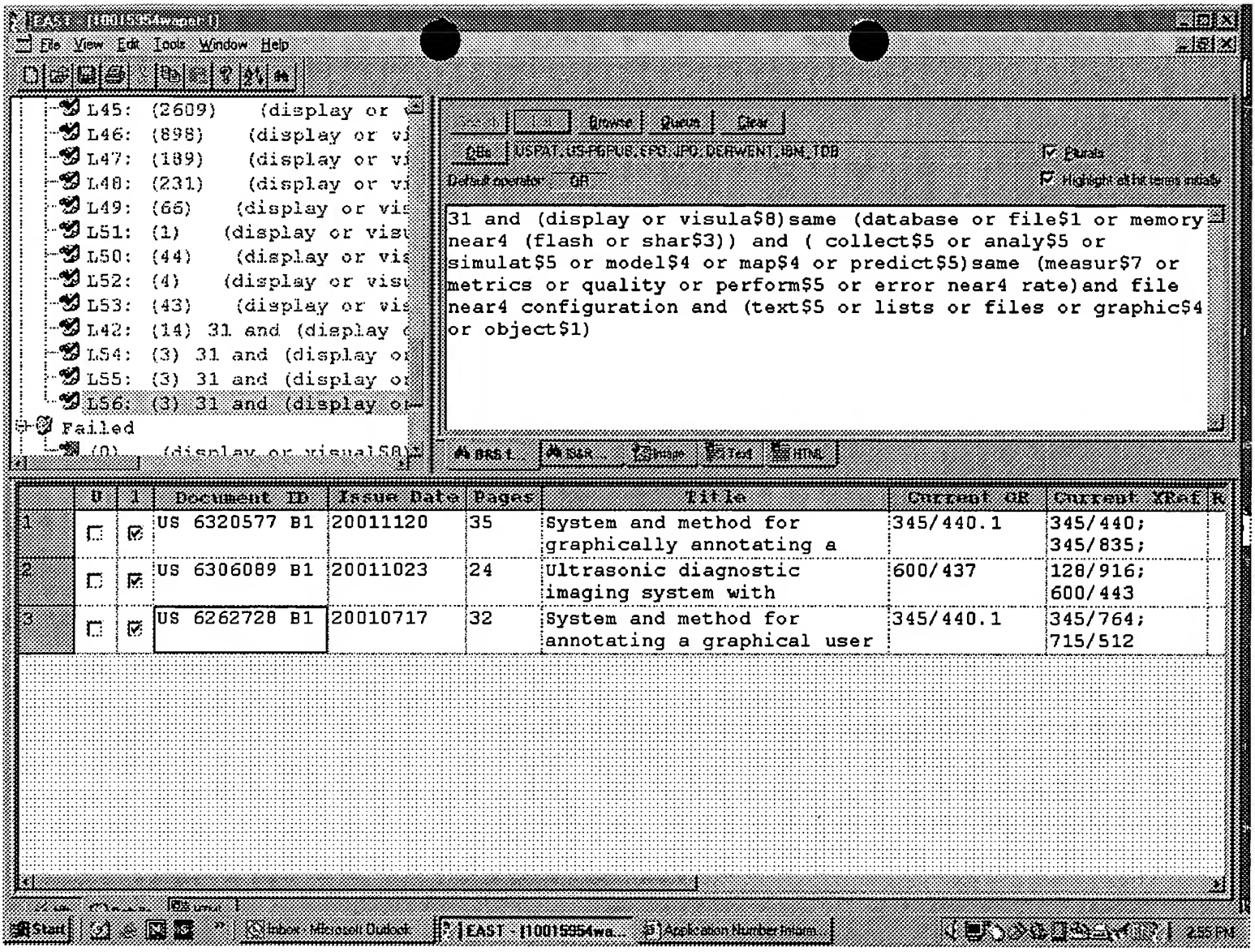
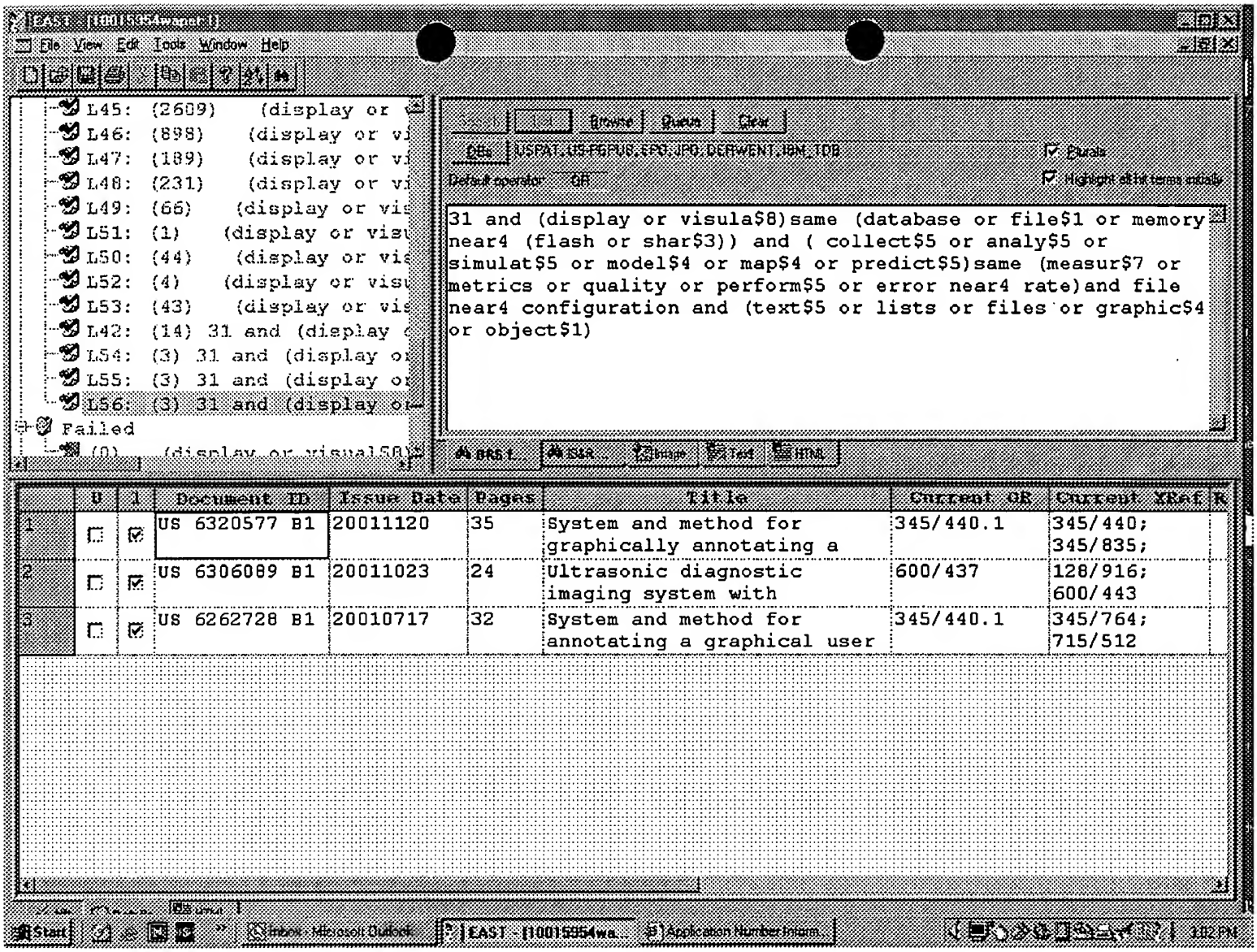

File Control Setup Measure Utilities Help
10:58 AM
50.0 kSa/s
200 mV/div
Print
Default Setup
Undo Default Setup
Autoscale
Undo Autoscale
Connect Dots
Averaging
Grid
Delayed Sweep
Sampling
Persistence
Undo Zoom
Redo Zoom
Add Label
Help
GENERAL INSTRUCTION MENU LIST
602
604
504
0.0s
-332 mV

FIG. 8


File Control Setup Measure Utilities Help
10:59 AM
Acquisition is stopped.
2.00 GSa/s
50 mV/div
1.00 V/div
1.00 V/div
1.00 V/div
802A
Test Setup #1
Nominal Voltage
Nominal Current
816
804
802B
Input Signal
850
818
820
Change Label Text
Color
Dent
Add Label
810
Delete Label
814
Delete All Labels
812
802C
Output Signal
852
504
More (1of2)
Clear All
40.0 ns/div
0.0s
30.1 mV



	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	R
1	☐	☑	US 6320577 B1	20011120	35	System and method for graphically annotating a	345/440.1	345/440; 345/835;	
2	☐	☑	US 6306089 B1	20011023	24	Ultrasonic diagnostic imaging system with	600/437	128/916; 600/443	
3	☐	☑	US 6262728 B1	20010717	32	System and method for annotating a graphical user	345/440.1	345/764; 715/512	



	D	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	R
1	☐	☑	US 6320577 B1	20011120	35	System and method for graphically annotating a	345/440.1	345/440; 345/835;	
2	☐	☑	US 6306089 B1	20011023	24	Ultrasonic diagnostic imaging system with	600/437	128/916; 600/443	
3	☐	☑	US 6262728 B1	20010717	32	System and method for annotating a graphical user	345/440.1	345/764; 715/512	

non-specialized worker can rapidly identify with ease the particular meaning or location or position of the measurement.

SUMMARY OF THE INVENTION

[0070] The invention provides for a system and method whereby measurement readings may be associated with one or more textual strings or graphical icons that have a specific meaning that allows one to understand or recall with ease the measurement type, measurement location, or measurement meaning by textual or graphical recognition based on one's desired cue or by an agreed-upon or learned symbology that may have nothing to do with the technical details of the measurement, itself. Furthermore, the invention allows, prior to an actual field measurement survey, the loading or preprogramming of textual strings or graphical icons to have particular measurement meanings, measurement instructions, or to denote particular locations or positions, without having to require the user of the invention to understand the technical details or specific attributes of the measurement data, itself. In addition, the invention allows a user to rapidly associate a particular collection of measurements to a particular region on a site-specific environmental model, without the need for the user of the invention to have specific knowledge of the coordinates or exact position location during the measurement survey, itself.

[0071] The benefit of the invention is that the user (or someone else) is able to define icons or textual descriptions that allow specific instructions

locations suggested by the displayed icon or graphical text.

[0079] By assigning or associating one or more textual strings and/or graphical icons to regions or locations within a map or 2D or 3D model of the environment, collected measurement readings can be displayed site-specifically overlaid onto or embedded within the map or 2D or 3D model of the environment by matching the textual strings and/or graphical icons associated with each measurement reading with the same textual strings and/or graphical icons assigned to or associated with particular regions, locations, or objects within the environmental model. Measurement readings may also simply be displayed and logged without site-specific information and without maps, by using the graphical icons or textual string designators that convey meaning.

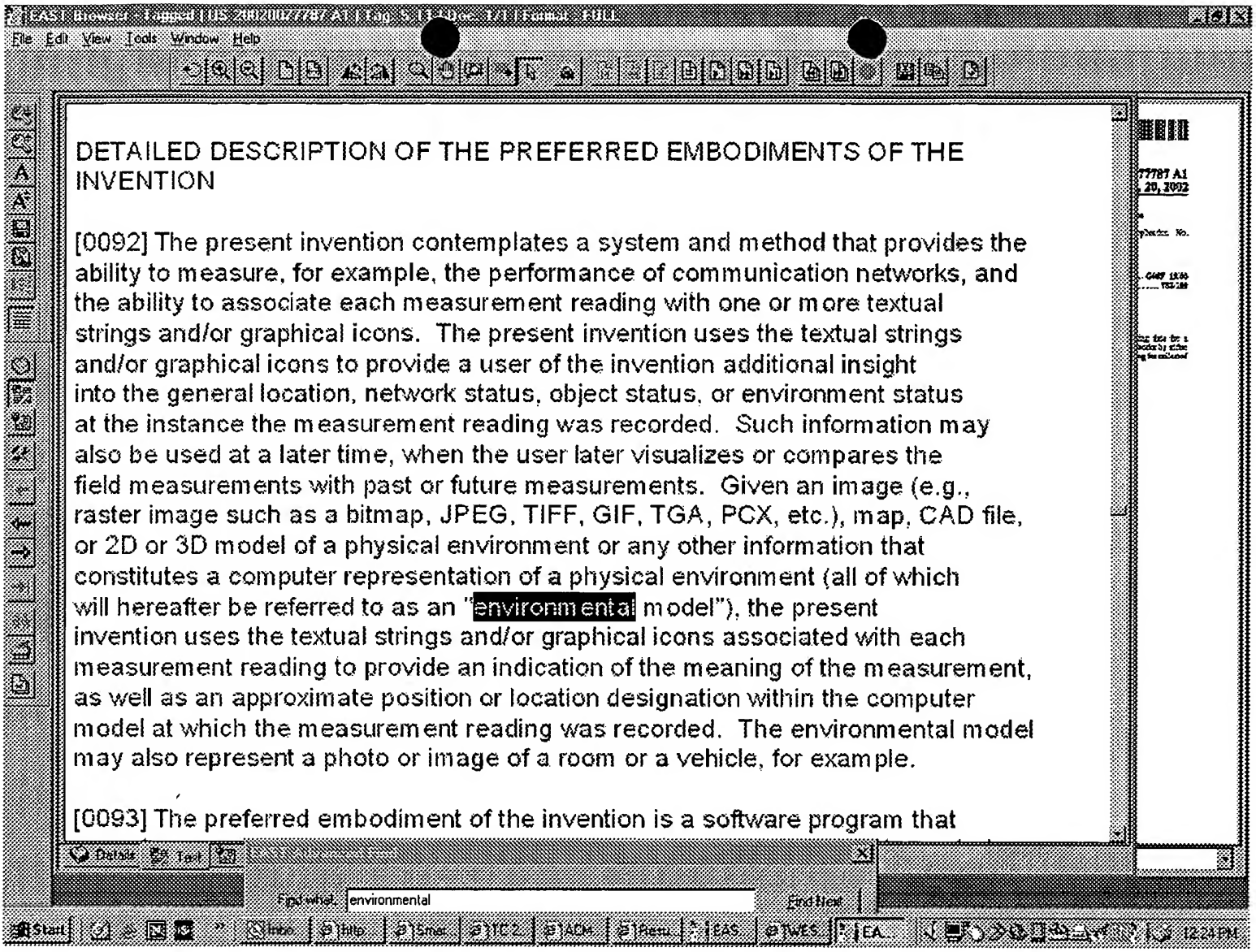
DRAWING DESCRIPTION:

BRIEF DESCRIPTION OF THE FIGURES

[0080] The invention is further described in connection with the following figures:

[0081] FIG. 1: Illustration of the difference between bits, packets and frames.

[0082] FIG. 2: Example of a personal computer system.



DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

[0092] The present invention contemplates a system and method that provides the ability to measure, for example, the performance of communication networks, and the ability to associate each measurement reading with one or more textual strings and/or graphical icons. The present invention uses the textual strings and/or graphical icons to provide a user of the invention additional insight into the general location, network status, object status, or environment status at the instance the measurement reading was recorded. Such information may also be used at a later time, when the user later visualizes or compares the field measurements with past or future measurements. Given an image (e.g., raster image such as a bitmap, JPEG, TIFF, GIF, TGA, PCX, etc.), map, CAD file, or 2D or 3D model of a physical environment or any other information that constitutes a computer representation of a physical environment (all of which will hereafter be referred to as an "environmental model"), the present invention uses the textual strings and/or graphical icons associated with each measurement reading to provide an indication of the meaning of the measurement, as well as an approximate position or location designation within the computer model at which the measurement reading was recorded. The environmental model may also represent a photo or image of a room or a vehicle, for example.

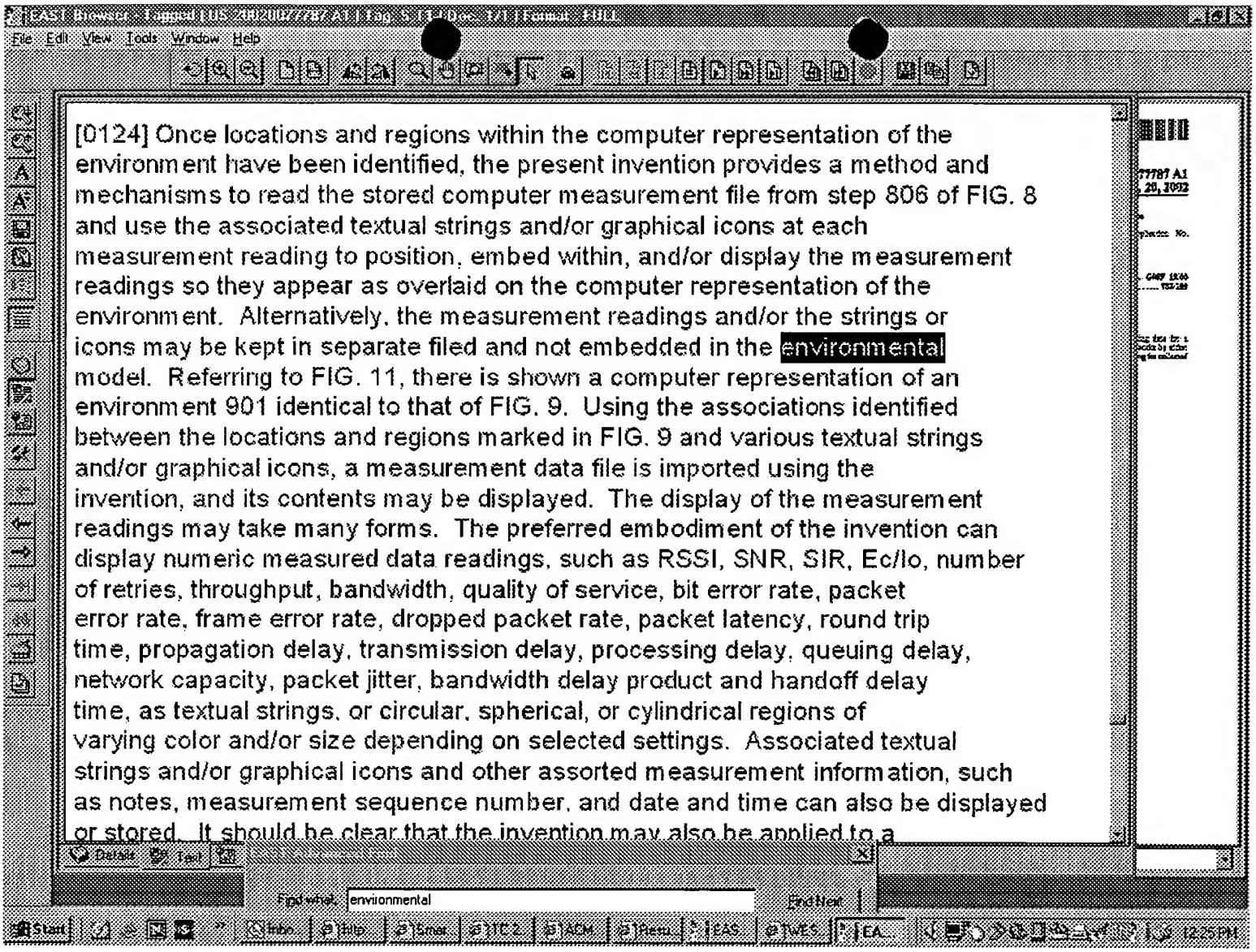
[0093] The preferred embodiment of the invention is a software program that

[0119] This provides the ability to make measured performance readings in a site-specific manner even though a site-specific computer representation of the environment was not available to the user at the time the measurement data was collected. This is a powerful new method for providing rapid, easy to perform measurement surveys that can be rapidly imported into site-specific design environments such as SitePlanner, without requiring the user to know specifically what the exact physical layout of the environment is. All the user needs to do is perform a measurement based on the cue given by the particular icon or text string, which instructs the user to the proper location in a facility to perform a measurement. Similarly, the invention may be applied to let users such as real estate assessors or facilities managers to collect field data without the users having to know explicit or exact location information during the survey, yet the graphical icons and/or textual strings have embedded within them or have a correspondence to the specific location information of the particular measurement so that the measured results can be mapped on to site-specific computer databases or onto maps that show city streets, neighborhoods, parts of a campus, or any other physical location details that were not explicitly available to the user of the invention during a survey. This allows a user to make measurements without the need of exact, environmental computer databases or maps, while supporting display of such data on environmental databases or maps after the survey.

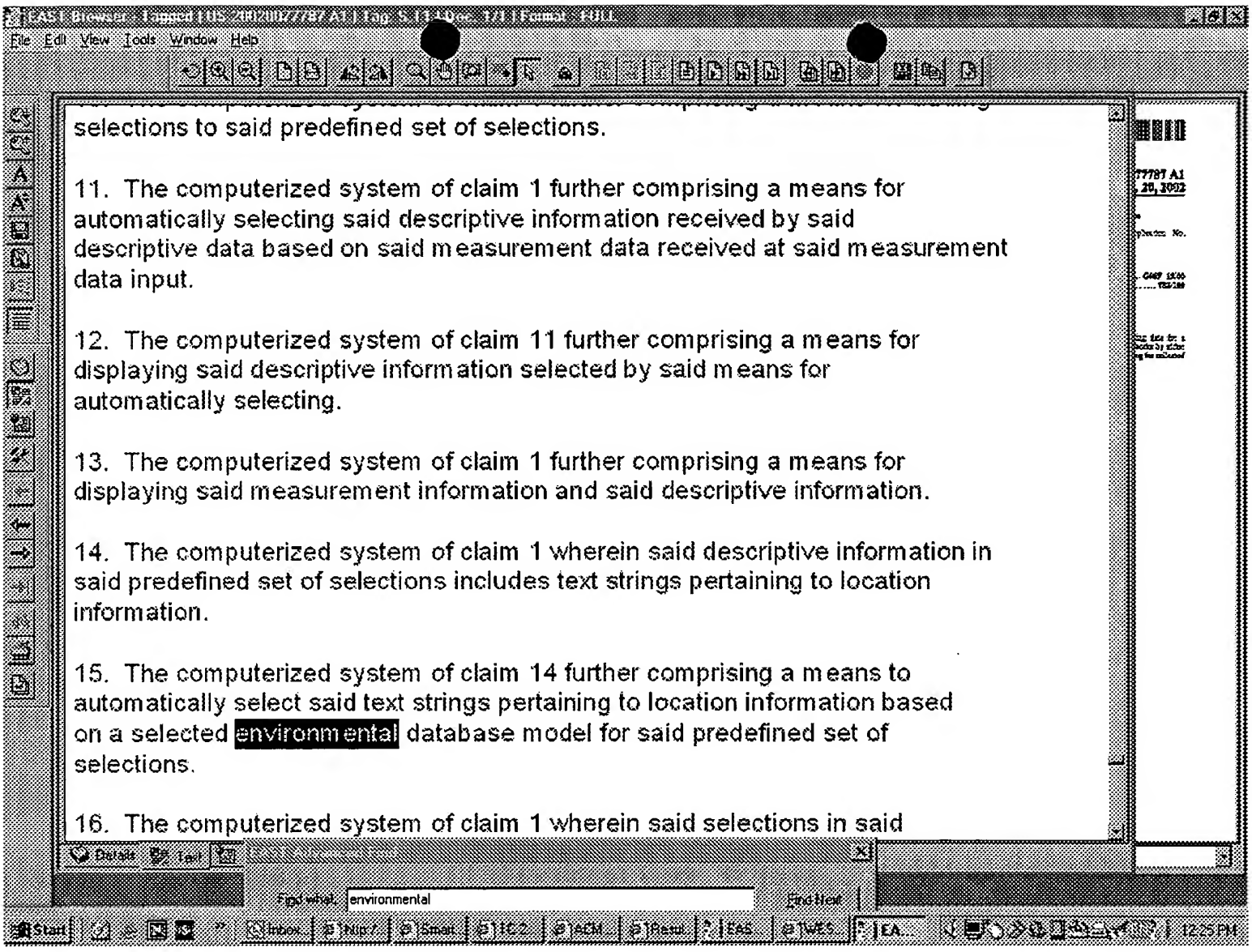
[0120] Referring to FIG. 9, there is shown a floor plan of a building 901. The

[0123] A similar process is applied when the computer representation of the environment is three-dimensional, as shown in FIG. 10. The preferred methods of acquiring a three-dimensional representation of an environmental model are provided in co-pending applications Ser. No. 09/318,841, entitled "Method And System For a Building Database Manipulator," filed by T. S. Rappaport and R. R. Skidmore (Docket 256015AA) and Ser. No. 09/954,273, entitled "Method and System for Modeling Terrain, Buildings, and Infrastructure," filed by T. S. Rappaport et al (Docket 256040AA). Given a 3D computer representation of an environment 1001 and using a computer input device such as a mouse, a user of the invention may select polygonal regions with height 1002, spherical regions 1003. cylindrical regions, individual locations, or identify textual labels 1004 and associate one or more textual strings and/or graphical icons with the selected regions, locations, or labels as described above.

[0124] Once locations and regions within the computer representation of the environment have been identified, the present invention provides a method and mechanisms to read the stored computer measurement file from step 806 of FIG. 8 and use the associated textual strings and/or graphical icons at each measurement reading to position, embed within. and/or display the measurement readings so they appear as overlaid on the computer representation of the environment. Alternatively, the measurement readings and/or the strings or icons may be kept in separate filed and not embedded in the environmental model. Referring to FIG. 11, there is shown a computer representation of an



[0124] Once locations and regions within the computer representation of the environment have been identified, the present invention provides a method and mechanisms to read the stored computer measurement file from step 806 of FIG. 8 and use the associated textual strings and/or graphical icons at each measurement reading to position, embed within, and/or display the measurement readings so they appear as overlaid on the computer representation of the environment. Alternatively, the measurement readings and/or the strings or icons may be kept in separate filed and not embedded in the environmental model. Referring to FIG. 11, there is shown a computer representation of an environment 901 identical to that of FIG. 9. Using the associations identified between the locations and regions marked in FIG. 9 and various textual strings and/or graphical icons, a measurement data file is imported using the invention, and its contents may be displayed. The display of the measurement readings may take many forms. The preferred embodiment of the invention can display numeric measured data readings, such as RSSI, SNR, SIR, Ec/Io, number of retries, throughput, bandwidth, quality of service, bit error rate, packet error rate, frame error rate, dropped packet rate, packet latency, round trip time, propagation delay, transmission delay, processing delay, queuing delay, network capacity, packet jitter, bandwidth delay product and handoff delay time, as textual strings, or circular, spherical, or cylindrical regions of varying color and/or size depending on selected settings. Associated textual strings and/or graphical icons and other assorted measurement information, such as notes, measurement sequence number, and date and time can also be displayed or stored. It should be clear that the invention may also be applied to a


selections to said predefined set of selections.

11. The computerized system of claim 1 further comprising a means for automatically selecting said descriptive information received by said descriptive data based on said measurement data received at said measurement data input.

12. The computerized system of claim 11 further comprising a means for displaying said descriptive information selected by said means for automatically selecting.

13. The computerized system of claim 1 further comprising a means for displaying said measurement information and said descriptive information.

14. The computerized system of claim 1 wherein said descriptive information in said predefined set of selections includes text strings pertaining to location information.

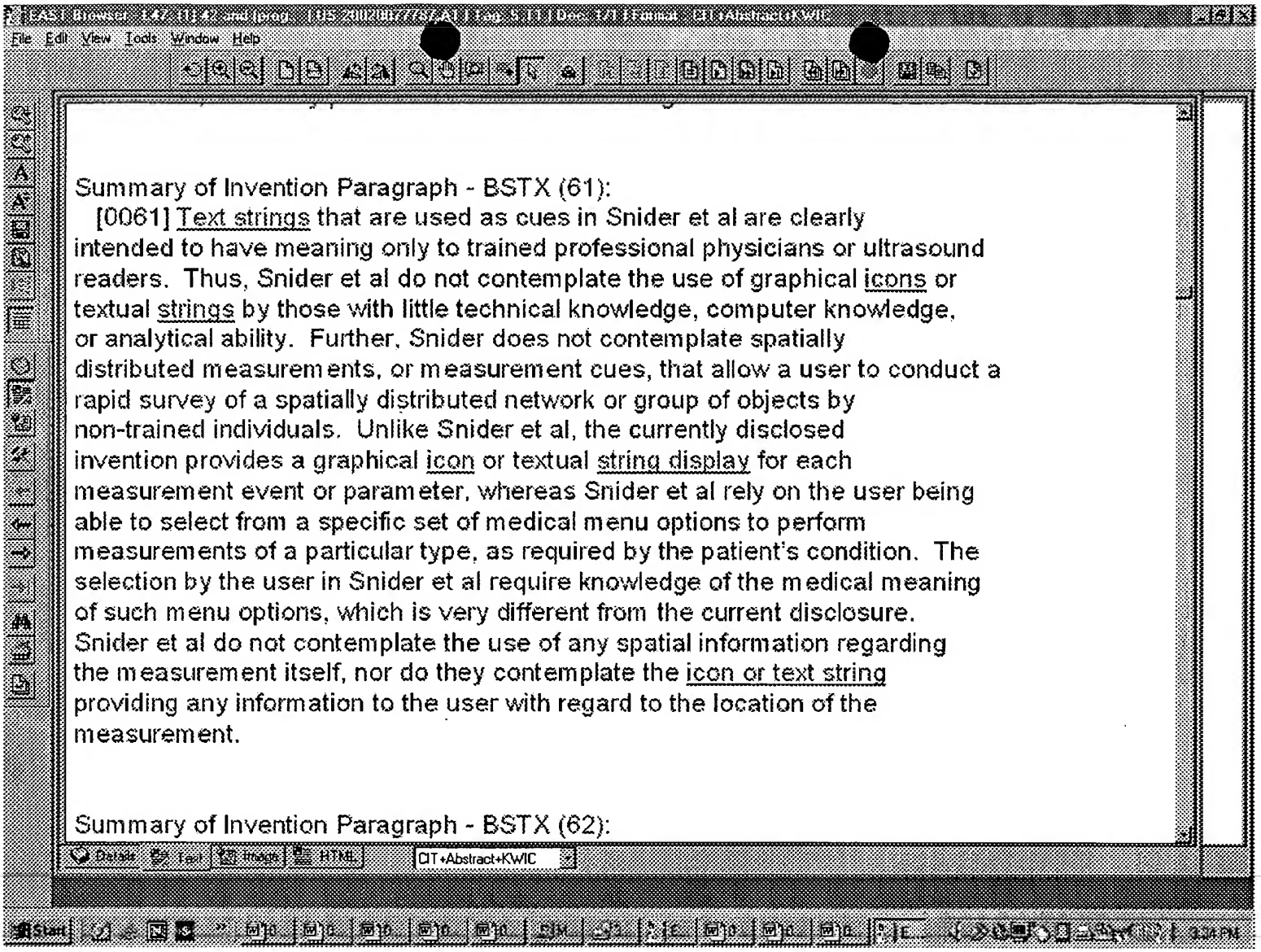
15. The computerized system of claim 14 further comprising a means to automatically select said text strings pertaining to location information based on a selected environmental database model for said predefined set of selections.

16. The computerized system of claim 1 wherein said selections in said

41. The method of claim 27 wherein said measurement information obtained in said obtaining information step pertains to communications between a slave and a host computer, and said measurement information is derived from communication parameters between said slave and said host computer.

42. A method for visualizing a spatially distributed group of objects or networks, comprising the steps of: collecting measurement information and descriptive information for said distributed group of objects or networks by obtaining measurement information selected from the group consisting of measured performance metrics and inputted quality measures, obtaining descriptive information from a predefined set of selections wherein said selections are selected from the group consisting of text strings and icons, and associating and storing said measurement information and said descriptive information; obtaining an environmental database model; and displaying at least one of said measurement information and said descriptive information collected in said collecting step together with at least a portion of said environmental database model.

43. The method of claim 42 wherein said measurement information and said descriptive information pertains to a specific location in said environmental database model and said step of displaying includes the step of displaying said at least one of said measurement information and said descriptive information at said specific location in said environmental database model.



Summary of Invention Paragraph - BSTX (61):

[0061] Text strings that are used as cues in Snider et al are clearly intended to have meaning only to trained professional physicians or ultrasound readers. Thus, Snider et al do not contemplate the use of graphical icons or textual strings by those with little technical knowledge, computer knowledge, or analytical ability. Further, Snider does not contemplate spatially distributed measurements, or measurement cues, that allow a user to conduct a rapid survey of a spatially distributed network or group of objects by non-trained individuals. Unlike Snider et al, the currently disclosed invention provides a graphical icon or textual string display for each measurement event or parameter, whereas Snider et al rely on the user being able to select from a specific set of medical menu options to perform measurements of a particular type, as required by the patient's condition. The selection by the user in Snider et al require knowledge of the medical meaning of such menu options, which is very different from the current disclosure. Snider et al do not contemplate the use of any spatial information regarding the measurement itself, nor do they contemplate the icon or text string providing any information to the user with regard to the location of the measurement.

Summary of Invention Paragraph - BSTX (62):

Summary of Invention Paragraph - BSTX (63):

[0063] Nowhere does Greenbaum et al teach the idea of allowing the user or a programmer to provide a customizable or selectable library of graphical icons or textual strings for the purpose of prompting the user with regard to the type or location of measurement to be performed, nor does Greenbaum et al teach the idea of icons or textual strings being used to provide interpretation of measured information by an untrained or unskilled user. Unlike our invention, Greenbaum et al provide a specific mathematical formulation for the creation of a specific display shape to represent a large number of measurement samples and measurement parameters, whereas the current invention teaches a selectable and customizable set of graphical icons or textual strings that may be completely arbitrary and may be completely independent of the particular measurement parameter, defined solely based on a user's personal preference for each measurement. That is, our invention provides a graphical icon or textual string display for each measurement event or parameter, whereas Greenbaum et al require a sampling of numerous measurements and numerous measurement parameters from blood samples before the specific graphical shape can be drawn. Furthermore, Greenbaum et al do not contemplate the use of any spatial information regarding the measurement or the measurement location in their patent, nor do they contemplate the use of the diagram to drive the user to select a particular measurement type or location, or to be used by those with little technical knowledge, computer knowledge, or analytical ability.

Summary of Invention Paragraph - BSTX (65):

[0065] U.S. Pat. Nos. 5,953,009 and 6,326,987 to Alexander describe a measurement icon annotation method whereby a user of an oscilloscope is able to annotate waveform measurements and measurement results with graphical icons, so long as the user drags the icons at the appropriate or proximate locations on the display of the oscilloscope. Alexander's invention allows the user to select a particular graphical icon in order to invoke a particular measurement operation on a displayed waveform in the oscilloscope window. The user, who is an engineer or technician, must rely on visual feedback and mental interpretation of the current displayed measurement of the waveform in order to use the invention. That is, Alexander teaches that the user must first view the waveform on the display, and then drag the icon to a particular location on the waveform on the user's display in proximity to the displayed waveform. Thus, the user relies on continuous feedback and technical interpretation of the displayed measurement, and must be able to view and make some interpretation of the displayed measurement (the waveform) in order to make decisions as to how to use the invention (placing the icon). Clearly, Alexander teaches in his invention that an icon must be positioned in a particular location on the display by a user by dragging the icon to a location that is deemed appropriate by the user, through the user's interpretation of the displayed waveform. The particular location on the display at which the user places the icon has a direct determination on the user's obtained measurement result.

Summary of Invention Paragraph - BSTX (66):

[0066] The currently disclosed invention is different from Alexander, as the current invention does not require the user to understand or interpret anything about the measurement being carried out, and the user is not required to place or move the graphical icons or textual strings in any fashion on a measurement display--the graphical icons or textual strings in the current invention may be completely arbitrary and completely unrelated to the desired measurement, and do not require positioning on the display by the user. Furthermore, unlike the present invention, Alexander fails to contemplate the idea of the icon or text string having the ability to be activated or to instruct or to provide customizeable cues that may be used to suggest a location or instruction to the user. Alexander does not contemplate an icon or text string having the ability to invoke a measurement by a user without initial knowledge or understanding of the measurement or without interpretation on the measurement display induced by the user. Alexander requires positioning of the icon to a proximate location on the display of the measured waveform, thus requiring the user to first obtain a desired waveform and to then interpret the particular portion of the waveform and the particular measurement that is of technical interest.

Summary of Invention Paragraph - BSTX (67):

[0067] Alexander does not teach our concept of the icon providing visual or mental cues that allow the user to invoke a measurement without having to

Summary of Invention Paragraph - BSTX (67):

[0067] Alexander does not teach our concept of the icon providing visual or mental cues that allow the user to invoke a measurement without having to possess any interpretation or knowledge of the measurement being performed. Unlike Alexander, the currently disclosed invention is not sensitive to the positioning of an icon on a screen in order to obtain meaningful measurements. That is to say, the present invention does not relate the graphical icon's position on a display to the accuracy or meaning of the measurement as is required by Alexander. In addition, Alexander does not consider the icon as providing any spatial information to the user as a cue for measurement position or location, nor does Alexander teach that the icon contains spatial information in the display of the measurement results.

Summary of Invention Paragraph - BSTX (68):

[0068] Furthermore, Alexander does not teach the idea of allowing the graphical icons or textual strings to be arbitrarily preprogrammed or customized by the user prior to, during, or after measurement use, such that user is able to use icons that have no logical relation to the particular measurement being conducted. Indeed, Alexander assumes a technical user (a technician or engineer) is operating the oscilloscope, and his inventions are geared toward improving efficiencies of technical individuals who must first interpret the displayed measured waveforms before annotating the results with

Summary of Invention Paragraph - BSTX (68):

[0068] Furthermore, Alexander does not teach the idea of allowing the graphical icons or textual strings to be arbitrarily preprogrammed or customized by the user prior to, during, or after measurement use, such that user is able to use icons that have no logical relation to the particular measurement being conducted. Indeed, Alexander assumes a technical user (a technician or engineer) is operating the oscilloscope, and his inventions are geared toward improving efficiencies of technical individuals who must first interpret the displayed measured waveforms before annotating the results with icons.

Summary of Invention Paragraph - BSTX (69):

[0069] The inventions, products, and patents cited above are useful for the design or measurement or analysis of the performance of communication networks and for other important measurement functions, such as in the medical field or in plant monitoring, but it is clear to one skilled in the art that it would be difficult for an untrained, unskilled worker to readily use the above listed products, inventions, or patents to rapidly conduct a field survey. That is, while the above-mentioned products or devices may measure one or more of the aforementioned performance metrics and display those in some fashion for analysis, none of the aforementioned inventions, products, or patents provide the means to measure or store measured network performance such that each measurement reading or measurement instruction is associated with some form of

Summary of Invention Paragraph - BSTX (69):

[0069] The inventions, products, and patents cited above are useful for the design or measurement or analysis of the performance of communication networks and for other important measurement functions, such as in the medical field or in plant monitoring, but it is clear to one skilled in the art that it would be difficult for an untrained, unskilled worker to readily use the above listed products, inventions, or patents to rapidly conduct a field survey. That is, while the above-mentioned products or devices may measure one or more of the aforementioned performance metrics and display those in some fashion for analysis, none of the aforementioned inventions, products, or patents provide the means to measure or store measured network performance such that each measurement reading or measurement instruction is associated with some form of textual or graphical identifier that can be used concurrently or at a later time for easy inspection or analysis of the data by a less-technical or untrained individual. None of the prior art contemplates the ability to instruct a user on how or where to collect measurements in an easy fashion, while allowing the measured performance metrics to be stored and displayed (visualized) in a novel way so that an untrained or non-technical or non-specialized worker can rapidly identify with ease the particular meaning or location or position of the measurement.

Summary of Invention Paragraph - BSTX (71):

[0070] The invention provides for a system and method whereby measurement

Summary of Invention Paragraph - BSTX (75):

[0074] No other aforementioned prior art provides for the display or storage or visualization of a measurement reading that has associated with it a definable and customizable textual string or graphical icon (other than a color variable, marker size, or simple tick mark adjustment) that has been preprogrammed by the user, a priori, to allow the user to instantaneously interpret the measurement value or physical location of the measurement through specific user-assigned contexts of the displayed icon or text message string. That is, in prior art products, a map is a simple bitmap image that does not represent or point out to the user the physical locations of walls, ceilings, or floors that are found on campuses and in buildings, and the measurements from the prior art products and patents do not provide any location-specific text or icon that allows the user to easily determine through context, before, during, or after the field survey, the general location or specific meaning of the measurement.

Summary of Invention Paragraph - BSTX (76):

[0075] Furthermore, in the prior art described above, there is not the ability for a user to pre-assign or to assign during or after a measurement survey some specific visual demarcations, such as symbols, shapes, icon graphics, or particular text strings, that may be displayed in real-time to the user of the product during the actual survey or in subsequent surveys. As described in U.S. Pat. No. 6,317,599 by Rappaport and Skidmore, the ability

Summary of Invention Paragraph - BSTX (76):

[0075] Furthermore, in the prior art described above, there is not the ability for a user to pre-assign or to assign during or after a measurement survey some specific visual demarcations, such as symbols, shapes, icon graphics, or particular text strings, that may be displayed in real-time to the user of the product during the actual survey or in subsequent surveys. As described in U.S. Pat. No. 6,317,599 by Rappaport and Skidmore, the ability to model and predict performance in a 3-D physical infrastructure model is recent, and the current invention adds to the state-of-the-art with a novel measurement, visualization, and archiving technique that can be used apart from, or in conjunction with, the SitePlanner and LANFielder products.

Summary of Invention Paragraph - BSTX (77):

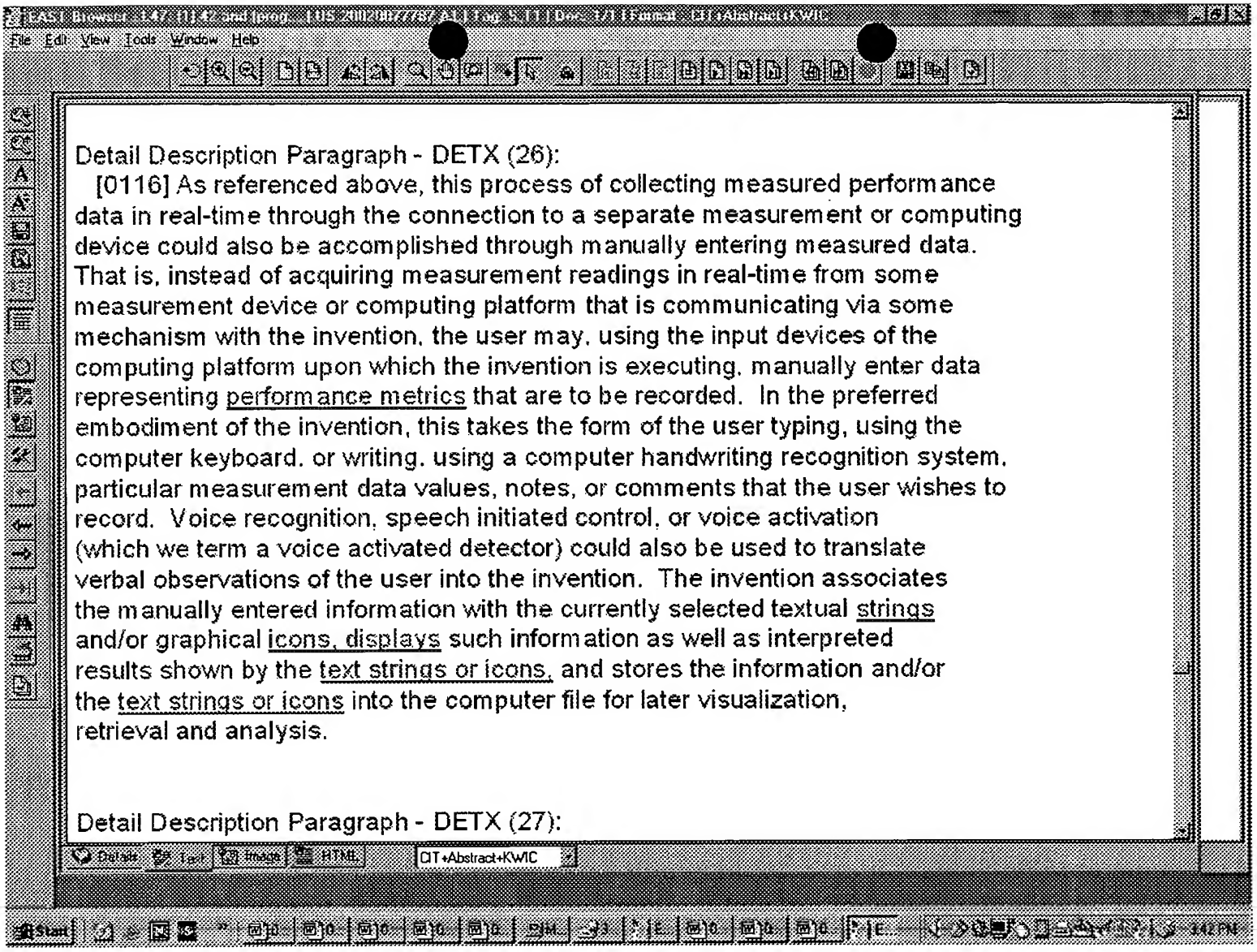
[0076] The present invention extends the prior art in a non-obvious way to provide wireless and wired network performance measurement, in real-time, using a novel display and storage method for the continuous logging, discrete logging, or through manual data collection, for important data communications-specific performance criteria, e.g. performance parameters or metrics, such as RSSI, SIR, SNR, Ec/Io, number of retries, throughput, bandwidth, quality of service, bit error rate, packet error rate, frame error rate, dropped packet rate, packet latency, round trip time, propagation delay, transmission delay, processing delay, queuing delay, network capacity, packet jitter, bandwidth delay product and handoff delay time. The invention contemplated here allows for a technician to walk around a building, or to

Detail Description Paragraph - DETX (23):

[0113] Using the computing platform input device, the user may select one or more textual strings and/or graphical icons using pull-down lists provided by the invention 804. In the preferred embodiment of the invention, the textual strings and/or graphical icons for selection are displayed as shown in FIG. 6. At any point, the user may elect to store the currently displayed measured performance metrics (or the person's manual measurements or observations (e.g., paint quality)) into a computer file 805. This occurs by using the computing platform input device to select the appropriate command within the application window. In the preferred embodiment of the invention, this occurs by selecting the "Save Data" button as shown in FIG. 6. When this occurs, the currently displayed measured performance metrics along with the currently selected textual strings and/or graphical icons are appended onto a computer file 806. The format of this file as used within the preferred embodiment of the invention is shown in FIG. 5. Other computer file formats could be used within the scope of the same invention. This process then repeats as many times as the user desires 807 during the survey or until the user exits the application. Note that the icons or strings may map to signify interpretations of particular observed measurement readings, and/or to the type of measurement desired, and/or to the location or position of the measurement, as explained above.

Detail Description Paragraph - DETX (24):

[0114] Referring again to FIG. 7, it is possible that the measurement device


File Edit View Tools Window Help
Detail Description Paragraph - DETX (26):
[0116] As referenced above, this process of collecting measured performance data in real-time through the connection to a separate measurement or computing device could also be accomplished through manually entering measured data. That is, instead of acquiring measurement readings in real-time from some measurement device or computing platform that is communicating via some mechanism with the invention, the user may, using the input devices of the computing platform upon which the invention is executing, manually enter data representing performance metrics that are to be recorded. In the preferred embodiment of the invention, this takes the form of the user typing, using the computer keyboard, or writing, using a computer handwriting recognition system, particular measurement data values, notes, or comments that the user wishes to record. Voice recognition, speech initiated control, or voice activation (which we term a voice activated detector) could also be used to translate verbal observations of the user into the invention. The invention associates the manually entered information with the currently selected textual strings and/or graphical icons, displays such information as well as interpreted results shown by the text strings or icons, and stores the information and/or the text strings or icons into the computer file for later visualization, retrieval and analysis.
Detail Description Paragraph - DETX (27):
Details
Text
Image
HTML
QT+Abstract+KWIC
Start

Detail Description Paragraph - DETX (30):

[0120] Referring to FIG. 9, there is shown a floor plan of a building 901. The preferred embodiment of the invention can open or import any form of raster image (e.g., Windows bitmap, JPEG, TIFF, TGA, GIF, etc.), vector image (e.g., AutoCAD DWG, DXF, DXX, Windows Metafile, etc.), map (e.g., aerial photograph, satellite imagery, etc.), or 2D or 3D computer model of the environment (e.g., Wireless Valley SitePlanner). The invention displays the representation of the environment on the computer display as shown in FIG. 9. Although the image shown in FIG. 9 is two-dimensional, any 2D or 3D model of the environment could be represented. Outdoor environments may also be represented. For example, a street map of a city could be imported and displayed. Once the computer representation of the environment is displayed, the user may associate locations or regions within the computer representation of the environment with one or more textual strings and/or graphical icons within the present invention. Using the present invention, the user may select one or more textual strings and/or graphical icons from pull-down lists as shown in FIG. 6, and then identifies the location or region within the computer representation of the environment where the stored measurement readings that have been associated with those textual strings and/or graphical icons should be displayed.

Detail Description Paragraph - DETX (31):

Summary of Invention Paragraph - BSTX (58):

[0058] U.S. Pat. No. 5,482,050 to Smokoff et al is in the area of medical instrumentation displays. Smokoff et al teach measurement results that map to a settable color table, and further teach that the location of the displayed color pixels may be positioned by the user on a display device. The invention also teaches that a program window may be minimized into an icon when a higher priority window or an alarm is to be displayed. Nowhere does Smokoff et al teach the idea of allowing the user or a programmer to provide a customizable or selectable library of graphical icons or textual strings for the purpose of prompting the user with regard to the type or location of measurement to be performed, nor does Smokoff et al teach the idea of icons or textual strings being used to provide interpretation of measured information by an untrained or unskilled user. Furthermore, Smokoff et al do not provide any spatial information regarding the measurement or the measurement location.

Summary of Invention Paragraph - BSTX (59):

[0059] U.S. Pat. No. 5,553,620 to Snider et al is in the area of ultrasound imaging display. Snider et al teach using graphical measurement tools to allow a physician or medical examiner to simplify the ultrasound recording process. Based on the specific diagnosis of the patient, the invention eliminates particular menu or measurement options, and displays a subset of technical menus, for easier use by the physician. Thus, feedback is provided by the apparatus based on observed measurements, where such stimulus

Summary of Invention Paragraph - BSTX (59):

[0059] U.S. Pat. No. 5,553,620 to Snider et al is in the area of ultrasound imaging display. Snider et al teach using graphical measurement tools to allow a physician or medical examiner to simplify the ultrasound recording process. Based on the specific diagnosis of the patient, the invention eliminates particular menu or measurement options, and displays a subset of technical menus, for easier use by the physician. Thus, feedback is provided by the apparatus based on observed measurements, where such stimulus may be given by the physician or automatically sensed during use of the invention.

Summary of Invention Paragraph - BSTX (60):

[0060] There are clear differences between U.S. Pat. No. 5,553,620 to Snider et al and the presently disclosed invention. Nowhere does Snider et al teach the idea of allowing the user or a programmer to provide a customizable or selectable library of graphical icons or textual strings for the purpose of prompting the user with regard to the type or location of measurement to be performed. Instead, Snider et al provide a specific set of menu text strings that have specific medical meaning, so that the medical professional can select from a subset of potential measurements. Snider et al do not teach the concept of preprogramming, customizing, or recasting the text strings prior, during, or after measurements, nor do they teach the idea of graphical icons or textual strings being used to provide interpretation of measured information by an

provided by the apparatus based on observed measurements, where such stimulus may be given by the physician or automatically sensed during use of the invention.

Summary of Invention Paragraph - BSTX (60):

[0060] There are clear differences between U.S. Pat. No. 5,553,620 to Snider et al and the presently disclosed invention. Nowhere does Snider et al teach the idea of allowing the user or a programmer to provide a customizable or selectable library of graphical icons or textual strings for the purpose of prompting the user with regard to the type or location of measurement to be performed. Instead, Snider et al provide a specific set of menu text strings that have specific medical meaning, so that the medical professional can select from a subset of potential measurements. Snider et al do not teach the concept of preprogramming, customizing, or recasting the text strings prior, during, or after measurements, nor do they teach the idea of graphical icons or textual strings being used to provide interpretation of measured information by an untrained or unskilled user. In fact, Snider et al do not contemplate the use of graphical icons or text strings for the display or storeage of particular measured results. Instead, Snider et al rely on measured results appearing as a scientific, medically pertinent ultrasound recording.

Summary of Invention Paragraph - BSTX (61):

6643614

US006654950B1

United States Patent

Barnishan

(10) **Patent No.: US 6,654,950 B1**

(45) **Date of Patent: Nov. 25, 2003**

SOFTWARE REHOSTING SYSTEM AND METHOD

Inventor: **Wesley V. Barnishan**, Columbus, OH (US)

Assignee: **BAE Systems Mission Solutions Inc.**, San Diego, CA (US)

Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

Appl. No.: **09/379,619**

Filed: **Aug. 24, 1999**

Int. Cl.[7] **G06F 9/45**

U.S. Cl. **717/136**

Field of Search 717/136, 143, 717/144; 704/1–10; 707/100–104.1

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Assistant Examiner—John Q. Chavis
(74) *Attorney, Agent, or Firm*—Nath & Associates PLLC; Harold L. Novick; Marvin C. Berkowitz

(57) **ABSTRACT**

A system, method and computer program for rehosting a legacy application computer program written in one computer program dialect to a target dialect, for porting a control computer program, such as a Test Program, from one hardware platform to another, and for analyzing a computer program and creating a report. The rehost computer program is used to create a translation module in a first dialect which is comprised of a plurality of processed statements that are parsed, formatted and generalized and to store the statements in a searchable tree format. An existing translation module is enhanced by processing a number of programs and adding only unique statements. Each statement in the existing translation module has as a nested array an equivalence in the target language. A legacy program to be rehosted is first parsed and formatted into the same processed statement types as in the translation module and then a look-up is performed on a statement by statement basis to find and store the equivalent statements in the translation module, replacing the generalized elements therein with the actual values in the processed legacy statements. When it is desired to have a report of the statistics of a computer program, that computer program is parsed and formatted into statements, and then the desired information about the statements is processed into a table or even flow chart.

50 Claims, 47 Drawing Sheets